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The Effectiveness of IBL and PBL Models in Terms of Self-Confidence and Students' Metacognitive Ability

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Abstract: This study aims to describe and compare the effectiveness of the IBL and PBL models in terms of students' self-confidence and metacognitive abilities. The research is carried out at SMA Negeri 1 Sewon class XI with the application material of algebraic function derivatives. The type of research used is an experiment with a quantitative approach, and the design used is quasi-experimental. The results showed that both IBL and PBL were effective the terms of self-confidence and metacognitive ability. Based on the comparison of learning models on self-confidence, there is no difference between the two models of the metacognitive ability of the PBL model is better than the IBL

Keywords: IBL Model, PBL Model, Self-confidence, Metacognition

Abstrak: Penelitian ini bertujuan untuk mendeskripsikan dan membandingkan keefektifan model IBL dan PBL ditinjau dari self-confidence dan kemampuan metakognisi siswa. Penelitian dilaksanakan di SMA Negeri 1 Sewon kelas XI dengan materi Penerapan Turunan Fungsi Aljabar. Jenis penelitian yang digunakan adalah eksperimen dengan pendekatan kuantitatif dan desain yang digunakan adalah eksperimen semu. Hasil Penelitian menunjukkan bahwa IBL dan PBL efektif dalam hal self-confidence dan kemampuan metakognisi siswa. Berdasarkan perbandingan model pembelajaran pada aspek self-confidence tidak ada perbedaaan antara kedua model, kemudian dilihat dari aspek kemampuan metakognisi menunjukkan PBL lebih baik dibandingkan IBL.

Kata kunci: Model IBL, Model PBL, Self-confidence, Metakognisi

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INTRODUCTION

Law of the Republic of Indonesia No. 20 of 2003 (UU RI No 20 Tahun 2003) concerning the National Education System has set the education system in Indonesia. Student competencies can achieve improved by national education goals. Permendikbud No 24 of 2016 contains student competencies into three components, namely attitude, knowledge, and skills.

Self-confidence is one aspect of the attitude of the ability to take appropriate and effective action in all difficulties (Burton & Platts, 2006). According to McElmeel (2002), self-confidence is the ability to be sure to act correctly, appropriately, and effectively. The self-confidence aspect can support student competence. Research Akbar et al. (2018), students do not yet have high curiosity, tend to be silent, and do not dare/are not confident when the teacher gives questions or exercises. In addition to attitude, one that affects student competence is the aspect of knowledge. Metacognition is an activity that describes several phenomena, activities, and experiences related to the control of cognitive functions (Hasselhorn & Labuhn, 2011). Metacognition must base on one's conscious activity. Ovan et al., (2018), metacognition means a person's awareness of the thinking process and the ability to control the process.

The improvement in this aspect of competence has been stated in Permendikbud No. 36 of (2018) concerning the learning curriculum in Indonesia. Mathematics is one of the compulsory subjects as stated in the RI Law No. 21 of 2016. Based on the results of the 2019 National Examination, Indonesian students' math scores are still below the KKM, by further examining the application material for the derivative of algebraic functions which is the material with the lowest UN score. SMA Negeri 1 Sewon is used as a research reference because it is a school with average student abilities. As an aspect of increasing students' self-confidence and metacognitive abilities, learning is needed that encourages students to be actively involved in the learning process. The right learning model, namely Inquiry (Inquiry Based Learning) and problem-based (Problem Based Learning), both models are also used as a reference for the government to improve student competence as stated in Permendikbud No 22 Year (2016).

However, Izzati's research (2018) found that in mathematics learning between IBL and PBL there was no difference in effectiveness. Meanwhile, research by Farhan & Retnawati (2014) found that in the mathematics learning process it was found that PBL was more effective than IBL. Based on this research, it becomes a reference for researching "The Effectiveness of Inquiry Based Learning and Problem Based Learning Models in terms of Self-confidence and Metacognition Ability of Class XI Students of SMA Negeri 1 Sewon on Algebraic Function Derivative Application Material".

METHODS

The type of research used is an experiment with a quantitative approach, and the research design used is quasi-experimental research. The research design was used to determine the effectiveness by measuring the pre-test and post-test scores in the two treatment groups. The first group uses the IBL learning model and the second group uses the PBL model. The research was conducted at SMA Negeri 1 Sewon class XI for the academic year 2020/2021 even semester from February 2021 to March 2021 with the material

Application of Algebraic Function Derivatives. The population in this study were all students of class XI MIPA SMA Negeri 1 Sewon for the academic year 2020/2021 totaling ± 198 students consisting of 6 classes (XII MIPA 1-XII MIPA 6). The sample in this study is the IBL method class with 55 students and the PBL method class with 57 students.

The technique of collecting data is by observing during learning, giving test questions and questionnaires pre-test and post-test to obtain data on self-confidence and students' metacognitive abilities. Before testing the test instrument and questionnaire, validation is carried out with two events, namely content validation, and construct validation. Content validation was carried out by two lecturers as validators to determine the validity of the questions and deserve to be tested. After being declared passed with a revision, then further testing is carried out to obtain valid and reliable data. Based on the data, the test instruments and questionnaires were valid and reliable.

Descriptive and inferential data analysis, where descriptive analysis was used to measure the sample mean, sample variance and sample covariance. Whereas inferentially, the assumptions were tested first, namely multivariate normality test, univariate normality test, homogeneity test of covariance matrix, and homogeneity of variance test. After testing, it was found that the assumption test was met, then a hypothesis test was carried out. Hypothesis testing is the effectiveness test using one sample t-test, comparative test of learning methods by testing the average vector using the MANOVA (Hotteling's Trace) test. If in the vector test the average is obtained before the same treatment and after different treatment, a further test is carried out using a two independent sample t test and to see which model is superior by looking at the 95% confidence interval inference for the difference between the two population averages.

Results and Discussion

The results of the implementation of learning are obtained as follows:

Table 1. *Percentage of Learning Implementation Observation Results*

No	Meeting	Percentage class %	
		IBL	***PBL***
1.	1st meeting	Pre-test and initial ability questionnaire	
2.	2st meeting	76,471	82,35
3.	3st meeting	82,353	82,35
4.	4st meeting	100	100
5.	5st meeting	100	100
6.	6st meeting	Post-test and final ability questionnaire	

Based on the results of observations on the implementation of learning in table 1, the highest percentage of IBL and PBL was obtained, namely at the 4th and 5th meetings of 100%. Meanwhile, the implementation of IBL at the 2nd meeting was 76.5%, and the lowest PBL at the 2nd and 3rd meetings was 82.35%. The learning process did not go well at the beginning of the meeting because using LMS media accompanied by learning videos did not cause students to interact directly with the teacher. The following are the learning outcomes that have been implemented:

The self-confidence of high school students with IBL and PBL learning

The results of descriptive statistics are obtained as follows:

Table 2. *Descriptive Statistics Self-confidence Data*

Description	IBL class		PBL class	
	Before treatment	After treatment	Before treatment	After treatment
Ideal Maximum Value	115	115	115	115
Maximum Value	101	104	101	106
Ideal Minimum Value	23	23	23	23
Minimum Value	60	60	60	68
Average	79,891	81,818	79,670	84,193
Variance	74,803	76,855	73,760	80,337
Standard Deviation	8,649	8,767	8,590	8,963

Based on the descriptive statistical table, the average self-confidence data in the PBL class is higher than the IBL class. The variance and standard deviation slightly increased after IBL and PBL treatments. Meanwhile, the comparison of self-confidence scores on each empirical factor is as follows:

Table 3. *Average Self-confidence Data Score*

Factors	Average value of each factor					
	IBL Class			PBL Class		
	Before treatment	After treatment	Enhancement	Before treatment	After treatment	Enhancement
Factor 1: Thought	66,65	69,40	2,75	69,02	72,83	3,81
Factor 2: Attitude	71,85	73,20	1,35	71,09	74,21	3,12
Factor 3: Action	68,79	69,76	0,97	66,55	71,99	5,44
Overall average	**69,10**	**70,79**	**1,69**	**68,89**	**73,01**	**4,12**

The average score of self-confidence data in the IBL and PBL classes has increased with the highest increase in the IBL class, namely factor 1 thinking, and PBL class, namely factor 3 actions. The frequency distribution of the self-confidence data scores before and after treatment is as follows:

Table 4. *Frequency Distribution of Self-confidence Data*

Interval	Criteria	IBL Model					PBL Model				
		Before treatment		After treatment		Enhancement	Before treatment		After treatment		Enhancement
		F	%	F	%		F	%	F	%	
$\bar{M} > 92$	**Very Good**	3	4,167	4	5,556	1,389	9	12,500	7	9,722	-2,778
$76{,}67 < \bar{M} \leq 92$	**good**	32	44,444	36	50,000	5,556	37	51,389	38	52,778	1,389
$61{,}33 < \bar{M} \leq 76{,}67$	**Enough**	19	26,389	14	19,444	-6,944	26	36,111	27	37,500	1,389
$46 < \bar{M} \leq 61{,}33$	**Less**	1	1,389	1	1,389	0,000	2	2,778	2	2,778	0,000
$\bar{M} \leq 46$	**Very Poor**	0	0,000	0	0,000	0,000	0	0,000	0	0,000	0,000

Based on the frequency distribution of self-confidence data in both models, both models show an increase in both criteria with the IBL class criteria being superior to the PBL class.

Metacognitive Ability of High School Students with IBL and PBL learning

Metacognition ability was measured using pre-test and post-test instruments with the following results:

Table 5. *Descriptive Statistics of Metacognitive Ability*

Description	IBL class		PBL class	
	Before treatment	After treatment	Sebelum Perlakuan	Before treatment
Ideal Maximum Value	100	100	100	100
Maximum Value	98	96	96	97
Ideal Minimum Value	0	0	0	0
Minimum Value	44	60	44	69
Average	66,36	81,41	66,35	85,30
Variance	147,73	82,48	192,23	47,89
Standard Deviation	13,06	8,56	13,86	6,92

Based on the descriptive statistical table of metacognitive abilities, it was found that the average IBL and PBL classes increased with the average post-test score in the PBL class being higher than the IBL post-test average. The variance and standard deviation decreased after treatment for both IBL and PBL classes. While the comparison of metacognitive ability scores in IBL and PBL classes is as follows:

Table 6. *Average Score of the Metacognitive Ability Component*

Components of Metacognition	Average value of each aspect					
	IBL Class			PBL Class		
	Pre-test	***Post-test***	**Enhancement**	***Pre-test***	***Post-test***	**Enhancement**
Planning	72,27	99,32	27,05	86,40	97,37	10,97
Monitoring	55,68	68,47	12,79	52,63	77,19	24,56
Self-controlling	77,27	84,23	6,96	67,76	90,79	23,03
Strategies	83,52	87,5	3,98	78,84	91,23	12,39
Evaluating	2,27	14,77	12,5	9,65	8,77	-0,88
Goal	41,76	78,27	36,51	47,81	83,11	35,3
Overall average	66,36	81,41	15,05	66,35	85,30	18,95

The average results of each metacognitive component both experienced an increase with the highest increase in the goal component. However, in evaluating (evaluating) the PBL class has decreased. Furthermore, the frequency distribution of metacognitive ability scores before and after treatment is as follows:

Table 7. *Frequency Distribution of Metacognitive Ability*

Interval	Kriteria	IBL Model					PBL Model				
		Before treatment		After treatment		Enhancement	Before treatment		After treatment		Enhancement
		F	%	F	%	%	F	%	F	%	%
$x \geq 92$	**Very high**	2	3,636	9	16,364	12,73	2	3,509	14	24,561	21,05
$85 \leq x < 92$	**high**	2	3,636	14	25,455	21,82	2	3,509	20	35,088	31,58
$78 \leq x < 85$	**Currently**	10	18,182	17	30,909	12,73	12	21,053	16	28,070	7,02
$x < 78$	**short**	41	74,545	15	27,273	-47,27	41	71,930	7	12,281	-59,65

The results of the frequency distribution of metacognitive abilities in both models showed an increase in the three criteria, namely 1) very high, 2) high, and 3) moderate.

The Effectiveness of Learning Algebraic Function Derivative Applications with IBL and PBL

The effectiveness test aims to see whether a learning is effective to improve a student's ability. The effectiveness test technique used is one sample t-test with α significance level of$= 0,05.$ Analysis using software **R** with t-test function. The following are the results of the one sample t-test for both groups of methods:

Table 8. *Test Results Effectiveness of one-sample t test*

Group Method	Variable	*One-Sample t test*
IBL	*Self-confidence*	t = 4,3551 p-value = 5,979e-05
	Metakognisi	t = 3,3947 p-value = 0,001294
PBL	*Self-confidence*	t = 6,3585 p-value = 3,946e-08
	Metakognisi	t = 7,973 p-value = 8,565e-11

From the data obtained, it can be stated that the IBL and PBL methods are effective in increasing self-confidence and metacognition. Seen in the p-value in each variable < 0,05. Because it gives effective results, it is continued by a separate univariate t test using two independent sample t tests as follows:

Table 9. *Test Results Effectiveness of one-sample t test*

Test	Variable	*t-test*	*p-value*
Two Independent sample t-test	*Self-confidence*	-1,437	0,154
	Metacognisi	-2,308	0,023

Based on the results of the t-test on self-confidence, there is no difference in the average self-confidence between classes using the IBL and PBL methods. Meanwhile, in the metacognitive ability between classes using the IBL and PBL methods, there are differences. Due to the differences in the results of metacognitive abilities, then proceed with a two independent sample t test by looking at the 95% confidence interval inference

for the difference between the two population averages, obtained $\mu_1 < \mu_2$, 95% sure that the average metacognitive ability of PBL class students is higher than IBL

CONCLUSION

Conclusions are obtained based on the results of hypothesis testing and discussion. Judging from the students' self-confidence and metacognitive abilities, the Inquiry-Based Learning (IBL) and Problem Based Learning (PBL) models are effective. There is a difference in effectiveness between the Inquiry-Based and Problem Based Learning models, seen from the students' metacognitive skills. There is no difference between the Inquiry-Based Learning and Problem Based Learning models. Problem Based Learning model is better at improving students' metacognitive abilities than Inquiry-Based Learning.

Based on the research results, Inquiry-Based Learning and Problem Based Learning models can be alternative learning. IBL and PBL can optimize students' self-confidence and metacognition in mathematics.

Based on the results, discussions, conclusions, and findings obtained during the research process, teachers and researchers can arrange material as best as possible in learning using the IBL and PBL methods. Conditions are not conducive due to COVID19, so learning by increasing face-to-face online, namely Google Meet, Zoom, and others.

BIBLIOGRAPHY

1. Akbar, G. A. M., Diniyah, A. N., Akbar, P., Nurjaman, A., & Bernard, M. (2018). Analisis Kemampuan Kemampuan Penalaran Dan Self Confidence Siswa Sma Dalam Materi Peluang. *Journal On Education*, *1*(1), 14–21.
2. Burton, K., & Platts, B. (2006). *Building Confidence fo Dummies*. John Wiley & Sons. Ltd,.
3. Farhan, M., & Retnawati, H. (2014). Keefektifan PBL Dan IBL Ditinjau Dari Prestasi Belajar, Kemampuan Representasi Matematis, Dan Motivasi Belajar. *Jurnal Riset Pendidikan Matematika*, *1*(2), 227. https://doi.org/10.21831/jrpm.v1i2.2678
4. Hasselhorn, M., & Labuhn, A. S. (2011). Metacognition and Self-regulated Learning. In *Encyclopedia of Adolescence* (Vol. 1, pp. 223–230). Elsevier Inc. https://doi.org/10.1016/B978-0-12-373951-3.00026-0
5. Izzati, L. R. (2018). *Efektivitas Model Problem-based Learning (PBL) dan Inquiry-based Learning (IBL) Ditinjau dari Kemampuan Pemecahan Masalah dan Keterampilan Metakognisi Siswa pada Materi Bangun Ruang Sisi Datar Kelas VIII SMP*. Universitas Negeri Yogyakarta (UNY).
6. McElmeel, S. L. (2002). *Character education: A book guide for teachers, librarians, and parents*.
7. Ovan, Waluya, S. B., & Nugroho, S. E. (2018). Analysis mathematical literacy skills in terms of the students' metacognition on PISA-CPS model. *Journal of Physics: Conference Series*, *983*(1). https://doi.org/10.1088/1742-6596/983/1/012151
8. *Republik Indonesia. (2003). Undang-Undang RI Nomor 20 Tahun 2003 tentang Sistem Pendidikan Nasional*. (n.d.).

9. Republik Indonesia. (2016). *Peraturan Menteri Pendidikan dan Kebudayaan RI No 22 tahun 2016 tentang standar proses pendidikan dasar dan menengah*. 1–15. http://luk.tsipil.ugm.ac.id/atur/bsnp/Permendikbud22-2016SPDikdasmen.pdf
10. Republik Indonesia. (2018). *Peraturan Menteri Pendidikan dan Kebudayaan RI Nomor 36 Tahun 2018 tentang Perubahan Permendikbud Nomor 59 tahun 2014 tentang kurikulum 2013 sekolah menengah atas/madrasah aliyah*. 1–12.

BRIEF PROFILE

Fani Yunida Anggrahenu adalah dosen program studi pendidikan matematika, Program Studi pendidikan Matematika, STKIP Modern Ngawi.